



U.S. Department
of Transportation

Pipeline and
Hazardous Materials
Safety Administration

COMPETENT AUTHORITY CERTIFICATION
FOR A TYPE B(U)

RADIOACTIVE MATERIALS PACKAGE DESIGN
CERTIFICATE USA/0382/B(U)-96, REVISION 17

East Building, PHH-23
1200 New Jersey Avenue SE
Washington, D.C. 20590

REVALIDATION OF UNITED KINGDOM COMPETENT AUTHORITY
CERTIFICATE GB/2835A/B(U)-96

This certifies that the radioactive material package design described is hereby approved for use within the United States for import and export shipments only. Shipments must be made in accordance with the applicable regulations of the International Atomic Energy Agency¹ and the United States of America².

1. Package Identification - Croft Associates Model 2835A.
2. Package Description and Authorized Radioactive Contents - as described in United Kingdom Certificate of Competent Authority GB/2835A/B(U)-96, Issue 2 (attached). Contents are limited to special form capsules containing not more than 370 Tbq (10,000 Ci) of Iridium 192, 0.11 Tbq (2.97 Ci) of Co-60, 467 Tbq (12,622 Ci) of Cs-137, or 877 TBq (23,703 Ci) of Se-75 in configuration and shielding containers as described in Croft Associates, "Package Contents Specification for Package Design No. 2835A", PCS 029, Issue D (attached).
3. General Conditions -
 - a. Each user of this certificate must have in his possession a copy of this certificate and all documents necessary to properly prepare the package for transportation. The user shall prepare the package for shipment in accordance with the documentation and applicable regulations.
 - b. Each user of this certificate, other than the original petitioner, shall register his identity in writing to the Office of Hazardous Materials Technology, (PHH-23), Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, Washington D.C. 20590-0001.
 - c. This certificate does not relieve any consignor or carrier from compliance with any requirement of the Government of any country through or into which the package is to be transported.

¹ "Regulations for the Safe Transport of Radioactive Material, 1996 Edition (Revised), No. TS-R-1 (ST-1, Revised)," published by the International Atomic Energy Agency(IAEA), Vienna, Austria.

² Title 49, Code of Federal Regulations, Parts 100-199, United States of America.

CERTIFICATE USA/0382/B(U)-96, REVISION 17

- d. Records of Quality Assurance activities required by Paragraph 310 of the IAEA regulations¹ shall be maintained and made available to the authorized officials for at least three years after the last shipment authorized by this certificate. Consignors in the United States exporting shipments under this certificate shall satisfy the applicable requirements of Subpart H of 10 CFR 71.
4. Special Conditions -
 - a. Due to its involvement in a transportation incident, serial number 5 is not authorized for use under the provisions of this certificate.
 - b. Package must be handled and operated in accordance with Croft Associates "Packing and Handling Instructions for Package Design No. 2835A", CPI 015, Issue L.
 - c. Package must be inspected and maintained in accordance with Croft Associates "Serviceability Checks on Package Design No. 2835A", CSP 009, Issue I.
 - d. Maximum heat load for the package is 57 watts.
5. Marking and Labeling - The package shall bear the marking USA/0382/B(U)-96 in addition to other required markings and labeling.
6. Expiration Date - This certificate expires on July 31, 2012.

This certificate is issued in accordance with paragraph 808 of the IAEA Regulations and Section 173.473 of Title 49 of the Code of Federal Regulations, in response to the July 04, 2007 petition by Croft, Inc., Los Alamos, NM, and in consideration of other information on file in this Office.

Certified By:



Robert A. Richard
Deputy Associate Administrator for Hazardous Materials Safety

Jul 27 2007

(DATE)

Revision 17 - issued to endorse United Kingdom Certificate of Competent Authority GB/2835A/B(U)-96, Issue 2, dated July 4, 2007.



Certificate of Approval of Package Design for the Carriage of Radioactive Materials

THIS IS TO CERTIFY that the Secretary of State for Transport being, for the purposes of the Regulations of the International Atomic Energy Agency, the Competent Authority of Great Britain in respect of inland surface transport and of the United Kingdom of Great Britain and Northern Ireland in respect of sea and air transport and the Department of the Environment for Northern Ireland being the Competent Authority of Northern Ireland in respect of inland surface transport, have approved the Package design as specified in section 1 of this certificate, as applied for by Croft Associates Limited (see section 6)

as Type B(U) (see paragraph 4.2)

by all modes.

Packaging identification: SAFKEG Design Number 2835A

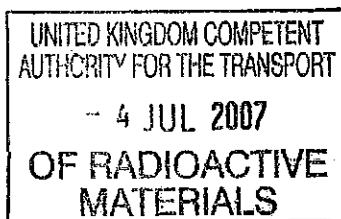
Packages manufactured to this design meet the requirements of the regulations and codes on page 2, relevant to the mode of transport, subject to the following general condition and to the conditions in the succeeding pages of this certificate.

In the event of any alteration in the composition of the package, the package design, the quality assurance programme(s) associated with the package or in any of the facts stated in the application for approval, this certificate will cease to have effect unless the Competent Authority is notified of the alteration and the Competent Authority confirms the certificate notwithstanding the alteration.

Expiry Date: This certificate is valid until the end of July 2012 (see section 6)

COMPETENT AUTHORITY IDENTIFICATION MARK:

GB/2835A/B(U)-96



Transport Radiological Adviser
Department for Transport
Great Minster House
76 Marsham Street
London SW1P 4DR

*On behalf of the Secretary of State for Transport,
and the Department of the Environment for Northern Ireland*

This certificate does not relieve the consignor from compliance with any requirement of the government of any country through or into which the package will be transported.

REGULATIONS AND CODES OF PRACTICE GOVERNING THE TRANSPORT OF RADIOACTIVE MATERIALS

INTERNATIONAL

International Atomic Energy Agency (IAEA)

TS-R-1 Regulations for the Safe Transport of Radioactive Materials 2005 Edition.

International Maritime Organisation (IMO)

International Maritime Dangerous Goods (IMDG) Code Amendment 32-04 (until 31 December 2007) or Amendment 33-06.

International Civil Aviation Organisation (ICAO)

Technical Instructions for the Safe Transport of Dangerous Goods by Air 2007-2008 Edition.

United Nations Economic Commission for Europe (UNECE)

European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) 2007 Edition.

Intergovernmental Organisation for International Carriage by Rail (OTIF)

Convention concerning International Carriage by Rail (COTIF) Appendix B. Uniform Rules concerning the Contract for International Carriage of Goods by Rail (CIM) Annex 1 Regulations concerning the International Carriage of Dangerous Goods by Rail (RID) 2007 Edition.

UNITED KINGDOM

ROAD

GREAT BRITAIN ONLY.

The Radioactive Material (Road Transport) (Definition of Radioactive Material) Order 2002, SI 2002 No. 1092.

The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2007, SI 2007 No 1573.

NORTHERN IRELAND ONLY.

The Radioactive Substances (Carriage by Road) Regulations (Northern Ireland) 1983, SR 1983 No 344. The Radioactive Substances (Carriage by Road) (Amendment) Regulations (Northern Ireland) 1986, SR 1986 No 61.

RAIL

GREAT BRITAIN ONLY.

The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2007, SI 2007 No 1573.

SEA

British registered ships. All other ships whilst in United Kingdom territorial waters. The Merchant Shipping (Dangerous Goods and Marine Pollutants) Regulations 1997, SI 1997 No 2367; Merchant Shipping Notice No MSN 1806 M, "The Carriage of Dangerous Goods and Marine Pollutants in Packaged Form - Amendment 33-06 to the International Maritime Dangerous Goods (IMDG) Code".

AIR

The Air Navigation Order 2005, SI 2005 No 1970. The Air Navigation (Dangerous Goods) Regulations 2002, SI 2002 No 2786. The Air Navigation (Dangerous Goods) (Amendment) Regulations 2007, SI 2007 No 28.

1. PACKAGE DESIGN SPECIFICATION

The Package Design Specification shall be in accordance with Croft Associates Design Safety Report reference DSR 2835A-96 Issue B dated 9 January 2004, Addendum No1 Issue B to DSR2835A-96 dated and modifications to the package design approved by the authority named on page 1 of this certificate under the established modifications procedure.

1.1 Specification of Design

Design No.	Title (number of components)	Drawing / Drawing List	Issue
2835	Outer / Keg (one))	B
2784 or 2801 (MkII)	Inner / Pot (one)) DL-1C-5401	
)	

1.2 Authorised Contents

- Iridium 192, Cobalt 60, Caesium 137 or Selenium 75 as described in PCS 029 Issue D.
- The maximum total activity shall not exceed the limits specified in PCS 029 Issue D as appropriate to the nuclide and inner container being carried.
- The maximum permitted heat load is 57 Watts
- The radioactive contents shall be contained in Special Form Capsules.

1.3 Package Dimensions and Weights

- Nominal Dimensions: 430 mm diameter x 540 mm high (see section 5 for package illustration)
- Maximum authorised gross weight: 127.1 kg

2. USE OF PACKAGE

2.1 Use of packaging

- The packaging shall be used in accordance with Croft Associates' Packing and Handling Instructions for Package Design No. 2835A, Reference CPI 015 Issue L. The primary containers carrying the radioactive material shall be packed using suitable packing material, so as to prevent gross movement or impacting upon one another during both normal and accident conditions of transport.
- Inspection and maintenance shall be carried out in accordance with Croft Associates' Serviceability Checks for Packaging Design No. 2835A, Reference CSP 009 Issue I.

2.2 Supplementary Operational Controls

- a) When the package contents exceed 64.8 TBq of Iridium 192 or 81.1 TBq of Caesium 137 the package shall be stowed such that there is an air space between it and surrounding cargo to allow dissipation of the internal heat emission.

2.3 Actions prior to shipment

- a) Administrative controls shall ensure that the contents are in accordance with section 1 of this certificate, and that the consignor and consignee hold a copy of the instructions on the use of the packaging.

2.4 Emergency Arrangements

- a) Before shipment takes place, the consignor shall have drawn up suitable emergency plans, copies of which shall be supplied to the UK Competent Authority on demand.
- b) If the consignor's own, or other approved emergency plans cannot be initiated, for any reason, then the police shall be informed immediately and requested to call the local NAIR (National Arrangements for Incidents involving Radioactivity) establishment.

2.5 Ambient temperature range for package design

- a) -40°C to +38°C

3. QUALITY ASSURANCE

3.1 Quality assurance programmes applicable to this design are:

- a) The Croft Associates Quality Manual,
- b) any other quality assurance programmes associated with the design, manufacture, testing, documentation, use, maintenance and inspection, and for transport and in-transit storage operations, that also comply with national or international standards for quality assurance which are acceptable to the authority named on page 1 of this certificate.

3.2 No alterations shall be made to the quality assurance programmes associated with this design and approved by the authority named on page 1 of this certificate unless that alteration has the prior approval of said authority, or it falls within the agreed change control procedures of that programme.

3.3 No quality assurance programme shall be used at any stage of the design, manufacture, testing, documentation, use, maintenance and inspection, and for transport and in-transit storage operations, unless said programme forms part of or is the quality assurance programme approved by the authority named on page 1 of this approval certificate.

4. ADMINISTRATIVE INFORMATION

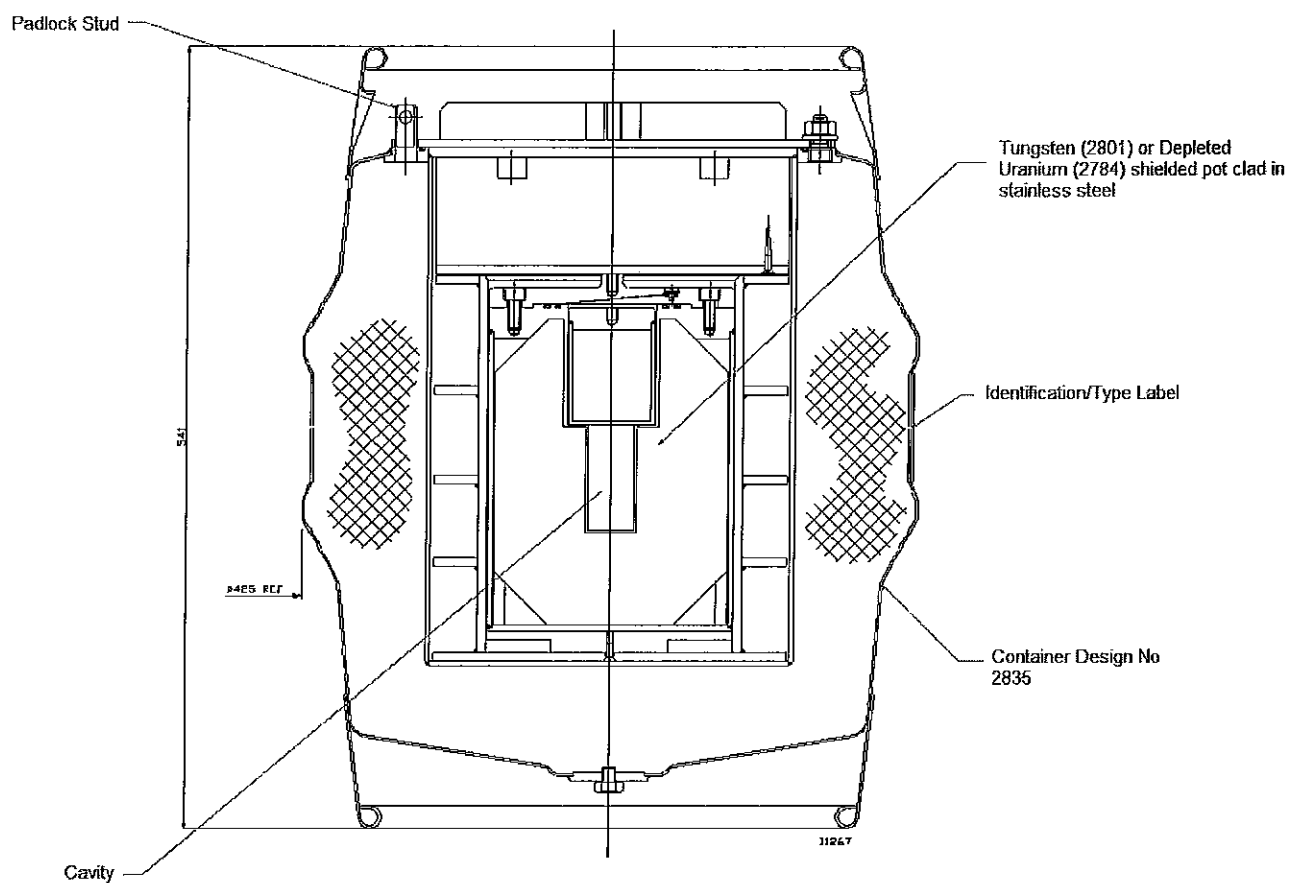
4.1 Other related certificates (alternative radioactive contents)

- a) This certificate forms the base approval of this design. At the time of compilation of this design approval certificate there were no other related UK certificates using the 2835 outer. Other related certificates may exist.

4.2 Additional Technical Data / Information

- a) At the time of compilation of this design approval certificate, The Ionising Radiations Regulations 1999, SI 1999 No 3232 and Approved Code of Practice apply, with regard to radiation protection, to all modes of transport and The Dangerous Substances in Harbour Areas Regulations 1987, SI 1987 No 37, apply in UK Ports

5. PACKAGE ILLUSTRATION



6. CERTIFICATE STATUS

Design Approval issued to:-

Croft Associates Limited
B2 North Culham Estate
Abingdon
Oxon
OX14 3GY

Issue No.	Date of Issue	Date of Expiry	Reason for Revision
GB/2835A/B(U)-96 Issue 1	14 January 2004	31 January 2007 Extended by letter to 31 July 2007	Design approval issued under new regulations
GB/2835A/B(U)-96 Issue 2	As date stamp on page 1	31 July 2012	Renewal incorporating the addition of Selenium-75 as a new content.

Package Contents Specification for
Package Design No 2835A

Contents Type 1

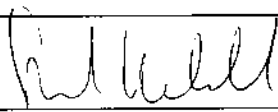

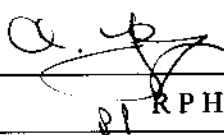
October 2006

Prepared by:
Croft Associates Limited
B2 North Culham Estate
Abingdon
Oxfordshire
OX14 3GY

Ref: Z2003/09/01

Package Contents Specification for Package Design No 2835A

Contents Type 1

Title	Package Contents Specification for Package Design No 2835A Contents Type 1	Number	PCS 029
		Issue	D
		File Reference	PCS 029-D
Compiled		Checked	 A L Ferguson
	S H Marshall		
Approved		Date	19 October 2006
	R P Hows		
Croft Associates Ltd, B2 North Culham Estate, Abingdon, Oxon, OX14 3GY UK Tel 44 (0)1865 407740			

1 Specification of contents

1.1 General nature of contents

The package is required to carry small quantities of Iridium, Cobalt, Caesium or Selenium in solid form, within Special Form capsules.

These capsules must be packed centrally within the shielded pots (for example, by the use of source carriers), such that they cannot “rattle” around within the cavity.

1.2 Radionuclides Included

See Column 1 of tables 1, 2 and 3.

1.3 Physical state

Solids or powders.

1.4 Chemical composition

Materials in either elemental, oxide or carbide form.

1.5 Quantity

The maximum quantity of radioactive material is arbitrarily set at 1.1kg.

1.6 Activity Limit

1.6.1 The package activity limits for individual nuclides are given in Tables 1, 2 and 3, under Package Limits (Columns 14 & 15). The Selenium is only to be carried in the depleted uranium pot 2784; therefore it only appears in table 1.

1.6.2 Where more than one radionuclide is present, the contents are limited as below:

a. 2784 Shielded Pot

Mixtures of the nuclides given in Table 1, which are individually limited by the Package Limit (Table 1 Columns 14 & 15) are limited such that the sum of the proportionate amounts of each nuclide with respect to the quantity shown does not exceed unity.

b. 2801 Shielded Pot

Mixtures of the unshielded nuclides (ie not in the tungsten pot) given in Table 2, which are individually limited by the Package Limit (Table 2 Columns 14 & 15) are limited such that the sum of the proportionate amounts of each nuclide with respect to the quantity shown does not exceed unity. The tungsten pot is only required for larger quantities of three nuclides, mixtures of nuclides within the pot are also proportionately limited as described above.

c. Content activity to be limited such that the total heat emission is to be not more than 57 W (see section 2.2).

1.7 Primary Containers and Packaging

Suitable primary containers are metal cans or equivalent, that are compatible with the materials of the both the container and the radioactive contents.

2 Calculation of allowable contents

2.1 Criticality Limits

N/A.

2.2 Heat limits

The heat limit has been set at 57W.

2.3 Shielding limit

As the contents could contain γ emitters a shielding assessment has been performed, the results of which are summarized in Tables 1, 2 and 3.

In Table 1, contents within the depleted uranium shielded pot (2784) are restricted such that external surface dose rates and TI (radiation level at 1m from the external surface of the package) do not exceed the regulatory limits for Non-Exclusive Use (paragraph 530 and 531 [1]).

In Table 2, contents within the tungsten shielded pot (2801) are restricted such that external surface dose rates and TI (radiation level at 1m from the external surface of the package) do not exceed the regulatory limits for Non-Exclusive Use (paragraph 530 and 531 [1]).

Table 3 shows the maximum activity limit when the package make-up consists of a 2801 pot, with the contents placed in its cavity within an additional tungsten shielded pot or liner.

2.4 Mass Limit

The upper limit on the contents mass is set at 1.1 kg.

The upper limit on the mass of any individual radionuclide has also been set arbitrarily at 1.1kg.

References

- [1] IAEA Safety Standards Series No TS-R-1, *Regulations for the Safe Transport of Radioactive Material* 1996 Edition (Revised) and 2005 edition.

Nuclide	Element	A1 Value Ref 1 (Bq)	Specific Activity Ref 2 (Bq/g)	Criticality Limit		Heat Output Ref 3 & Ref 4 (W/Bq)		Heat Limit		Shielding Limit Ref 5 (Bq)	Mass Limit		Activity limit for air transport 3000*A1 (Bq)	Package Limits	
				(Bq)	(g)			Watt Limit	Activity (Bq)		(g)	(Bq)		(Bq)	(g)
Ir-192	Iridium	1E+12	3.40E+14	N/A	N/A	1.54E-13	57	3.7013E+14	3.7013E+14	3.7E+14	1100	3.74E+17	3E+15	3.70E+14	1.09E+00
Co-60	Cobalt	4E+11	4.19E+13	N/A	N/A	4.16E-13	57	1.3702E+14	1.3702E+14	1.1E+11	1100	4.61E+16	1.2E+15	1.10E+11	2.62E-03
Cs-137	Caesium	2E+12	3.23E+12	N/A	N/A	1.22E-13	57	4.6721E+14	4.6721E+14	5.2E+14	1100	3.55E+15	6E+15	4.67E+14	1.45E+02
Se-75	Selenium	3.00E+12	5.38E+14	N/A	N/A	6.50E-14	57	8.7674E+14	8.7674E+14	9.07E+18	1100	5.92E+17	9E+15	8.77E+14	1.63E+00
References															
1 IAEA TS-R-1 Editions 1996 (Revised) and 2005															
2 IAEA TS-G-1.1 (ST-2)															
3 Croft Associates, CTR 83/3															
4 Croft Associates, CS 2006/41															
5 Croft Associates, CTR 98/16															
Notes															
(i) A1 Values taken from Table 1 of TS-R-1 (Gamma/Beta emitting nuclides), Specific Activities calculated using formula from paragraph 240.2 in TS-G-1.1															

Table 1: Activity Limits for Contents Type 1 within a 2784 Shielded Pot

Nuclide	Element	A1 Value Ref 1 (Bq)	Specific Activity Ref 2 (Bq/g)	Criticality Limit		Heat Output Ref 3 (W/Bq)	Heat Limit		Shielding Limit Ref 4 (Bq)	Mass Limit		Activity limit for air transport 3000*A1 (Bq)	Package Limits	
				(Bq)	(g)		Watt Limit	Activity (Bq)		(g)	(Bq)		(Bq)	(g)
Ir-192	Iridium	1E+12	3.40E+14	N/A	N/A	1.54E-13	57	3.7013E+14	1.1995E+14	1100	3.74E+17	3E+15	1.20E+14	3.52E-01
Co-60	Cobalt	4E+11	4.19E+13	N/A	N/A	4.16E-13	57	1.3702E+14	5.06E+10	1100	4.61E+16	1.2E+15	5.06E+10	1.21E-03
Cs-137	Caesium	2E+12	3.23E+12	N/A	N/A	1.22E-13	57	4.6721E+14	2.178E+13	1100	3.55E+15	6E+15	2.18E+13	6.75E+00
References														
1 IAEA TS-R-1 Editions 1996 (Revised) and 2005														
2 IAEA TS-G-1.1 (ST-2)														
3 CTR 83/3														
4 Croft Associates, CTR 98/16														
Notes														
A1 Values taken from Table I of TS-R-1 (Gamma/Beta emitting nuclides), Specific Activities calculated using formula from paragraph 240.2 in TS-G-1.1														

Table 2: Activity Limits for Contents Type 1 within a 2801 Shielded Pot

Nuclide	Element	A1 Value Ref 1 (Bq)	Specific Activity Ref 2 (Bq/g)	Criticality Limit		Heat Output Ref 3 (W/Bq)	Heat Limit		Shielding Limit Ref 4 (Bq)	Mass Limit		Activity limit for air transport 3000*A1 (Bq)	Package Limits	
				(Bq)	(g)		Watt Limit	Activity (Bq)		(g)	(Bq)		(Bq)	(g)
Ir-192	Iridium	1E+12	3.40E+14	N/A	N/A	1.54E-13	57	3.7013E+14	3.7E+14	1100	3.74E+17	3E+15	3.70E+14	1.09E+00
Co-60	Cobalt	4E+11	4.19E+13	N/A	N/A	4.16E-13	57	1.3702E+14	1.1E+11	1100	4.61E+16	1.2E+15	1.10E+11	2.82E-03
Cs-137	Caesium	2E+12	3.23E+12	N/A	N/A	1.22E-13	57	4.6721E+14	9.4E+13	1100	3.55E+15	6E+15	9.40E+13	2.91E+01
References														
1 IAEA TS-R-1 Editions 1996 (Revised) and 2005														
2 IAEA TS-G-1.1 (ST-2)														
3 Croft Associates, CTR 83/3														
4 Croft Associates, CTR 98/16														
Notes														
(i) A1 Values taken from Table II of TS-R-1 (Gamma/Beta emitting nuclides), Specific Activities calculated using formula from paragraph 240.2 in TS-G-1.1														

Table 3: Activity Limits for Contents Type 1 within a 2801 primary shielded pot with an additional inner tungsten liner/pot



U.S. Department
of Transportation

Pipeline and
Hazardous Materials
Safety Administration

East Building, PHH-23
1200 New Jersey Avenue SE
Washington, D.C. 20590

CERTIFICATE NUMBER: USA/0382/B(U)-96, Revision 17

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